Geophysical Research Abstracts
Vol. 20, EGU2018-5349-1, 2018
EGU General Assembly 2018

Holocene shortening in the transition between the Pampean Ranges and the Eastern Cordillera, Calchaquí valley (26°00'-25°50'lat, 66°00'-65°50'long), Argentina

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Despite its location in the orogen interior, the intermontane Calchaqui Valley (CV) in the transition between the reverse-faulted Eastern Cordillera and Sierras Pampeanas morphotectonic provinces of the NW Argentine Andes is characterized by active seismicity and hosts numerous geomorphic manifestations of sustained Quaternary tectonic activity. These include offset alluvial fans and pediments, and different generations of folded lacustrine sediments. These deposits are thus valuable tools for bridging the gap between historical/instrumental seismicity data and deformation intervals that may span several millennia. As such, an analysis of these neotectonic features may help to define intraplate fault recurrence and the assessment of the regional seismic potential.

We studied this Quaternary fluvial-lacustrine and alluvial-fan sediments exposed on the E side of the eastern CV. The folded units are separated by angular unconformities which were used to separate them into eight different stratigraphic units. The lacustrine units reflect repeated valley impoundments in the narrow Las Conchas east of the confluence between the Calchaquí and Santa María rivers.

The youngest deformed lacustrine deposit (unit 7) is tentatively correlated with a paleolake existing between 13.830 $\pm$ 790 and 4810 $\pm$500a (surface exposure ages on the landslide that generated the rockfall-dammed lake, Hermanns et al. 2004).

The units 1 to 7 have all been affected by post-sedimentary deformation associated with fault-propagation folds and thrusts. These deformed units were balanced using 2D Move to further quantify deformation in this region. Considering that the deformation that affected the youngest lacustrine deposits occurred <4800 yrs, the shortening rate is approximately 4mm/yr. Interestingly, this rate is in the same order of magnitude as current GPS-based velocity data (9.1$\pm$0.9 mm/yr) obtain in regions farther north (Mc Farlay et al. 2017); this documents shows that despite the location in the orogenic interior relatively high deformation rates appear to have been sustained on millennial timescales. In light of the destructive earthquakes in San Carlos and La Poma (intensity VI and Ms 6 respectively) in 1930, suggests that protracted shortening in this region of the Andes has been active and that seismic hazard evaluation have to be adjusted accordingly.

Hermanns, R.L. et al., 2004. Landslides, 1: 113–122.

McFarland, P. K. et al., 2017. Journal of Geophysical Research: Solid Earth, 122: 2-22.